ED 374 150 TM 022 077

AUTHOR Tushnet, Naida C.
TITLE Housing Star Schools Reforms.
INSTITUTION Southwest Regional Lab., Los Alamitos, CA.
SPONS AGENCY Office of Educational Research and Improvement (ED), Washington, DC.
PUB DATE Apr 94
CONTRACT RP92168001
NOTE 16p.; Paper presented at the Annual Meeting of the American Educational Research Association (New Orleans, LA, April 4-8, 1994).
PUB TYPE Reports - Evaluative/Feasibility (142) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Building Design; *Computer Uses in Education; *Demonstration Programs; *Design Requirements; *Distance Education; *Educational Facilities; Educational Technology; Elementary Secondary Education; Financial Support; Program Evaluation; Space Utilization; *Technological Advancement; Telephone Communications Systems
IDENTIFIERS Electrical Wiring; *Star Schools

ABSTRACT

The Star Schools Program has funded projects to explore innovative educational applications of technology in distance education. Funded projects have applied a variety of technologies, including videodisks, compressed data transmission, fiber optic technology, and computer networks. Program evaluation is a mandated aspect of the program. This paper, as part of a national evaluation of Star schools, focuses on issues related to the physical capacity of schools. It reflects information about the barriers and facilitators of technology applications at all 11 projects funded. The major purpose of site observations was to gain insights into the degree to which students have the opportunity to interact with one another and with the distance-learning teacher, as well as student learning and the role of on-site facilitators. Facilities-related issues center on space, telephone lines, and wiring. These issues will face any technology-based program in the future and must be considered along with issues of teacher training and integrating distance education with other educational reforms. (Contains 10 references.) (SLD)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED 374 150

Southwest Regional Laboratory

4665 Lampson Ave., Los Alamitos, CA 90720

(310) 598-7661

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☑ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

HOUSING STAR SCHOOLS REFORMS

Naida C. Tushnet
Southwest Regional Laboratory

American Educational Research Association Annual Meeting
New Orleans
April 1994

BEST COPY AVAILABLE

HOUSING STAR SCHOOLS REFORMS

Naida C. Tushnet
Southwest Regional Laboratory

American Educational Research Association Annual Meeting
New Orleans
April 1994

This paper was prepared under contract No. RP92168001, Office of Educational Research and Improvement, U.S. Department of Education. The content does not necessarily reflect the views or policies of the U.S. Department of Education, nor does the mention of trade names, commercial products, or organizations imply endorsement by the Department.

Introduction

During the past decade, new communication delivery technologies have proliferated. Such technologies include satellites with microwave receivers, fiber-optic and coaxial cable television, teleconferencing systems, fax machines, and nationwide computer networks. Simultaneously, several independently organized efforts have attempted to use these "distance-learning" technologies to deliver what they intended to be high-quality experiences to elementary and secondary school students and teachers. These efforts exist at local, county, and regional levels and involve audiographics; two-way computer conferencing with audio interaction; instructional television fixed service (ITFS); one-way broadcast or point-to-point audio, data, and video, with the possibility of audio return; and microwave, two-way point-to-point audio, data, and video transmission. Each technology, with its strengths and limitations, continues to be used in various localities to increase student access to learning opportunities, but there is no consistency across the nation.

The federal government, through the Star Schools Program Assistance Act, has encouraged:

> ...improved instruction in mathematics, science, foreign languages, and other subjects, such as literacy skills and vocational education...to serve underserved populations, including disadvantaged, illiterate, limited-English proficient, and disabled students through distance learning technologies. (Education Acts, Amendments, 1991)

The Office of Educational Research and Improvement (OERI) of the U.S. Department of Education (USED) has provided funding for three successive cycles of two-year Star Schools projects. Congress acknowledged the importance of assessing the program by including a requirement for an evaluation of the Star Schools Program in the 1991 reauthorization. The Southwest Regional Laboratory (SWRL), with a subcontract to Abt Associates Inc. (AAI), received the contract to carry out the national evaluation. This paper is based on that evaluation and its mandated report to Congress (Tushnet et al., 1993).

The Star Schools Program has become a focal point of the USED's efforts to explore innovative educational applications of technology. Along with satellite-based distance learning, which was new to schools at the inception of the Star Schools Program, funded projects have applied a variety of technologies, including videodisks, compressed data transmission, and computer networks, to reach their goals. The Star Schools Program is working with fiber-optic technology in a statewide demonstration, and projects are using computer networks to provide

teachers with a wide range of information about instruction and curriculum. In addition, funded projects are using technology and various distance-learning delivery systems to assist teachers in major educational reforms. And, the original purpose of Star Schools remains—to use technology to provide courses to students who would not otherwise have access to them.

The Star Schools Program has been the focal point of USED's efforts related to educational applications of technology. The Clinton administration has signaled a more active role for the federal government in encouraging the development and use of technology in schools to enhance student learning. Two indications of the Clinton administration's concern for the issue are the appointment of USED's first full-time technology adviser, an enthusiastic advocate of increased access to technology, and the attention, in speeches, that Vice President Al Gore devotes to including schools on the "information superhighway."

If schools are to become major "on- and off-ramps" of the superhighway, policymakers must address the capacity of elementary and secondary schools to join that national endeavor. Capacity includes human resources, including the ability of teachers to make decisions about appropriate use of technology, and the availability of high-quality educational products, including audio-visual and data-based products. Capacity also includes adequate facilities to house the varieties of educational technology that support student and teacher development.

Without minimizing the importance of humans and curriculum in the development and use of educational technology, this paper focuses on issues related to the *physical* capacity of schools. Information for the paper is drawn from the Star Schools Program Evaluation. Consequently, the paper reflects greater knowledge about the barriers and facilitators of some technology applications, mainly satellite-based and fiber-optic systems, than others (e.g., computer networks). Nonetheless, the lessons learned are useful in contemplating broader issues related to school facilities.

The paper begins with an overview of the methods used in the Star Schools Program Evaluation. It then summarizes the findings related to school facilities. It concludes with a brief discussion placing the issues in the context of the inclusion of schools on the information superhighway.

Methodology

The first year of the Star Schools Evaluation relied primarily on qualitative data collection procedures. The evaluation was designed to yield defensible understandings of the existing Star Schools projects and how the activities they developed were implemented in schools. The evaluation drew on the following data sources:

- a literature review encompassing research findings from distance learning-related studies and of alternative approaches to achieving the objectives addressed through Star Schools activities;
- site visits to Star Schools projects and schools; and
- reviews of project documents, including proposals, reports, and financial statements.

Project agendas and site protocols, adapted from procedures described by Miles and Huberman (1984; 1994), provided the means of integrating the data from various sources. Project reports were analyzed using a content analysis procedure that provided quick retrieval of project-generated information related to the development and implementation of Star Schools activities (Marshall & Rossman, 1989). The information was then included in project agendas, which, in turn, were used to generate site protocols. The site protocols identified the individuals to interview and events to observe during the site visits to Star Schools projects and schools. One use of the protocols was to highlight "missing" information that must be gathered on site. Another was to indicate the questions that probed more deeply into project activities, organization, problems, and impact than was possible from written documents. During the analysis phase, the project agendas provided a means of integrating qualitative data collected on site and quantitative data gleaned from project documents.

The first phase of the study involved data triangulation; that is, collecting information from multiple sources using multiple methods. Staff collected descriptions of activities from project-generated documents; interviews with project staff, staff from participating institutions, and the recipients of services; and observations of the activities.

Staff visited all 11 projects funded in the three cycles of funding, although visits to schools served by new Cycle Three projects did not take place until 1994. (Of the Cycle Three projects, only schools served by the statewide network have been visited at this point. Consequently, the paper will focus primarily on schools served by Cycle One and Two projects and those projects

that received funding in earlier cycles as well as Cycle Three. Cycle Three included four projects that received funding earlier and two new projects.)

The site visits included visits to project headquarters, with interviews of key staff, and visits to at least two schools served by the project, one of which was close to headquarters and another distant from it. At least one visited school was a Chapter 1-eligible school. Project staff were asked to suggest "best-case" schools in each category—that is, schools in which distance-learning activities are well-implemented. Using "best-case" schools, with a focus on Chapter 1 schools, enhanced the opportunity to provide information about the potential of distance learning. Further, individuals at such sites productively reflected on the problems they encountered and how they overcome them, thus providing information about how to structure policy related to distance-learning implementation. For the purposes of this paper, the focus on "best-case" schools provides information about the ingenuity used to overcome barriers to implementation posed by school facilities.

Two-person teams conducted the site visits. They spent at least four days on site, two at project headquarters and one at each school. The site visits had two purposes:

1. They provided the opportunity to confirm and extend the information gleaned from project documents.

2. They yielded information to address evaluation questions associated with project organization and actual school-level experiences with Star Schools. The site visits were particularly important in revealing problems of implementation related to local conditions.

In addition to interviews with project staff and teachers and administrators at school sites, staff observed Star Schools classes. The major purpose of the observations was to gain insights into the degree to which students have the opportunity to interact with one another and with the distance-learning teacher, student responses, and the role of the on-site facilitators.

The information collected on site was synthesized by the site-visit team following its visits. Team members reread interview notes, notes from observations, and project documents. They prepared an interpretive summary of their findings, which served two purposes. First, it provided a concise statement of the progress and problems of a particular Star Schools project. Second, it contained tentative analyses that explained the status of the project.

Site visitors reviewed the interpretive summaries to develop what Yin (1981) calls "causal arguments" both within and across cases. The causal arguments were used to identify the

existence of phenomena in more than one case under predictable conditions. For example, a preliminary analysis revealed that the use of taped, as contrasted with live, broadcasts was related to the structured broadcast schedules, which met project needs to provide regular service, but conflicted with in-school schedules. Using taped broadcasts also was related to the availability of telephones in receiving classrooms. The causal argument is that the combination of rigid technologies and organizational inertia, exacerbated by the lack of access to a technology integral to the program, leads to flexible use of programming.

Findings

Three facilities-related issues undergird the implementation of distance-learning technology in schools. First, schools must have adequate space to house distance-learning equipment. Second, schools must have adequate telephones, particularly for interactive satellite-based distance learning. And, third, schools must have adequate wiring for the use of technology. In general, within the Star Schools Program, the more different technologies that were in use, the greater the problems were for schools in each of these areas.

In this section, each of the three facilities-related issues is discussed, with examples drawn from the Star Schools Program. Each discussion includes a description of why the issue is important, the problems encountered, and ways schools dealt with them. For the most part, schools participating in Star Schools distance learning solved the problems; however, according to staff at project headquarters, a number of schools expressed interest in joining but withdrew after finding out the facilities demands. We were unable to verify the number of such schools, but as a result of the visits to operating school sites, we believe the facilities issue limited the spread of Star Schools distance learning.

Space

The most basic need for housing distance learning is space. Although satellite-based, distance-learning programs require only a classroom inside the school (as well as the outside dish), a number of schools found it difficult to dedicate space to the program. This was particularly true for distance-learning projects that provided full-course instruction in courses that were otherwise unavailable to students. Further, distance-learning projects that rely on multiple technologies have a need for a room in which students can use the equipment or one in which it can be stored between uses. In addition, the space problem was particularly significant in the statewide fiber-optics demonstration project, which will be discussed later in this section.

The difficulty in finding space for distance-learning activities was greatest in those schools that added courses to their existing curriculum through the Star Schools Program. Of the activities offered over the life of the Star Schools Program, almost 60% were courses for high school students to which they would not otherwise have access. Access to foreign language instruction (French, German, Japanese, Latin, Russian, and Spanish at various levels) accounted for 55% of all content area opportunities provided through Star Schools instruction at the high school level. Advanced placement (AP) courses, including mathematics and science AP courses (13%), other science instruction (13%), and other mathematics instruction (11%) represented the second most frequently offered distance-learning opportunities. Social science (6%) and humanities (2%) were provided less often.

These courses were offered primarily, although not exclusively, to rural schools. Enrollment levels were high overall—11,630 students were enrolled in Star Schools foreign language courses in 1992-93—but low at each participating site, with as few as one student served in a course. On average, each participating school served six students in each Star Schools course.

The low enrollments meant that although space was needed for an additional course, small spaces could be used. In fact, most schools did not use full classrooms to house the Star Schools Program. The tendency was to take over storage spaces or offices. Such conversion presented problems. At one site, the facilitator reported having to move out boxes and create a "comfortable" setting for students, although the setting was far from luxurious. In another site, the Star Schools Program shared space with a counselor, occasionally creating some conflicts.

Although space is only one issue related to the delivery of full courses, there has been a decline in school participation in such courses. Currently, only one Star Schools project provides programs in high school science and mathematics. Project staff are not sure of the reasons for the decline, and SWRL plans to ask more questions about it during the current school year.

While small spaces could be converted for Star Schools classes that serve small numbers of students at each site, a greater problem existed for Star Schools activities that used multiple technologies. Those generally require a full classroom, although the same students did not use it all day. In middle and high schools, where staff and students are comfortable with changing rooms for different classes, this seldom presented a problem. However, in elementary schools, teachers were unsure of leaving "their" things when other classes entered, and there were concerns about the security of the equipment. The one Star Schools project that relied heavily on multiple technologies did not continue after federal funding ceased. However, the reason seemed more

related to problems in developing the educational program and preparing teachers to use it than to concerns about space.

Finally, the statewide fiber-optics network has experienced the greatest problems with school space. That project has a "point of presence" (POP) in each of 99 counties. The network requires a small room to hold the network equipment and a classroom fully equipped to send and receive programming. The project director reports that over half the schools designated as POPs had problems in locating space for the system, and even active users claim that their use is limited because they cannot free a second classroom for the network. In two instances, the local districts modified plans in place for using bond funds for building to ensure adequate space for the network. However, at least seven districts sought, but were unable to pass, bond authorization to accommodate the system. The state's long range plan is to extend the system, but issues related to space, among others, are creating a political problem for so doing.

Overall, it is difficult to assess the extent to which concerns about space limit the use of distance learning. The schools participating in the Star Schools Program, after all, have solved the space problem. Staff at project headquarters have stories they tell about schools that were unable to participate, but few records were kept to assess the number of such schools accurately. Nonetheless, other evidence about school facilities presented in this symposium would indicate that space is a limiting factor in extending opportunities to participate in distance-learning programs.

Telephone Lines

Five of the seven currently funded Star Schools projects rely heavily on the use of telephones to create live, interactive instruction. To enhance interactivity, the projects provided an "audio bridge"—a single or series of telephone lines to connect classrooms directly with the studio teacher during the broadcast. Through telephones, students ask studio teachers questions, respond to questions asked by studio teachers, and receive individualized supplemental assistance. Some projects used the audio bridge on a first-come-first-served basis, while others rotated systematically among schools so that each school or classroom would be guaranteed "on-air" time. The extent of interaction often depended on the initiative of the on-site facilitator. The amount of interaction also was a function of the total number of schools enrolled in the course or module: the larger the enrollment, the less access to on-air time.

Some projects also used the audio bridge immediately after a program aired, during specific "office hours" for the studio teacher, and/or during prearranged tutorials with other staff. Audio-

bridge time also was enhanced during special-event broadcasts so that incoming calls were directed to several professionals in addition to the studio teacher. Unlike real-time interaction, such uses do not require a telephone in the classroom; students can call from any office or even their own homes.

In contrast, the real-time, live interaction requires a telephone in each participating classroom. Not a single participating school had a classroom already equipped with a telephone when the program began. And, the project directors reported both technical and sociocultural difficulties in fully half they sites they served. On the technical end, schools had to install additional telephone lines and extend lines to classrooms. This presented a challenge, particularly in older schools.

Bringing telephones to classrooms is not only a technical problem. Schools, as teachers frequently note, are not hospitable to what is perceived as a "private line." The culture of schools does not encourage any teacher to have what is seen as a special privilege, and a classroom telephone is considered special. In over half the sites visited and at all project headquarters, the issue of telephones was raised as a major impediment to implementation. Urban sites had the most difficult time installing telephones, for reasons stemming both from the outdated facilities and school norms. One project director asserted that there would be less problems in installing telephones if they were called "data ports," a term he believed was a more accurate characterization of their use in distance learning.

Although most Star Schools classrooms had telephones, not all did. In fact, one school identified as a "best-case" school, received the same Star Schools program in two classrooms, neither of which had a telephone. The teachers reported that, early in their participation, they sent students to the office to call the studio teacher, but the students had trouble getting through to the studio. Consequently, students could either watch the instructional module *or* call in—and by the time they reached the studio, the moment had long passed. In that site, also, teachers reported that they seldom showed the module live, but rather taped it so it could be shown at times convenient for their schedules and could be replayed for limited-English proficient students. The lack of access to telephones decreased the reasons to make an effort to use the module live.

As in the case of space, most participating schools had solved the telephone problem. That it is a salient issue is noted because all participants and project staff had stories about the first year and the difficulties of installing telephone lines.

Wiring

The final facilities-related issue that affected Star Schools activities was electrical wiring to classrooms. This problem was most severe for older schools and for projects that use multiple technologies.

The extent to which multiple technologies were used was in part related to project objectives. Full-course instruction always used satellite technology that was usually enhanced with an audio bridge, computer networking (particularly electronic mail), compressed data transmission, or fax machines. Supplemental instruction designed to enhance classroom teaching typically used more varied technologies.

One project provided a menu of multiple technologies from which participating middle school teachers chose those most applicable to their school, and all schools were provided with the needed equipment to use the technologies. School sites for that project were selected in a competition limited to "high-need" districts, with the school writing a proposal for how they would use the programs and accompanying technologies to improve educational opportunities for their students. In all but three cases, the schools selected were able to accommodate the equipment. In the three cases, classrooms had to be rewired to make maximum use of the menu of technologies. The menu was too rich for any site to use in a single year so the facilities issue forced the phasing of the activities in those sites, while in other sites teachers were able to select technologies according to their needs and interests.

Project staff reported that more than half the sites they served had problems with wiring. In urban sites, rewiring classrooms raised issues of turf because the building and grounds unit is responsible for upgrading the physical plant, and the Star Schools Program worked through departments of curriculum and instruction. Thus, preparing classrooms for distance-learning technologies involved negotiations between two moderately sized bureaucracies within a large bureaucracy.

Star Schools projects and the districts they served were able to upgrade wiring in sufficient numbers of schools to meet project objectives. However, the difficulties indicate potential limitations on program expansion.

Conclusion

The Star Schools Program confronted the types of facilities-related problems that will face any technology based program in the future. As attention to including schools as active participants in the information superhighway increases, these issues will be faced by an increasing number of schools. Compared to the number of schools in the nation, participation in Star Schools is fairly limited, and the administration is arguing that all students should have access to the highway.

The administration seems aware of the obstacles to full access to the superhighway. According to Kahlenberg (Jan. 10, 1994), Vice President Gore is:

> ...lately fond of quoting the new head of the Federal Communications Commission, Reed E. Hundt, who said, "There are thousands of buildings in the country with millions of people in them who have no telephones, no cable television, and no reasonable prospect of broadband services. They're called schools."
>
> Translation: There's no on-ramp connecting public education to the information highway (B7).

And, although American schools use external networks more often than other countries, only 35% of high schools (teachers, students, or administrators) report using one during the school year, and 16% report using one daily or weekly (Anderson, 1993). Only 22% of schools reporting use of computer networks for students during a year owned a modem (Steinert-Threlkeld, Jan. 16, 1994).

There is much talk about the need to help educators "cross the last mile," from fiber-optic and coaxial cable networks to schools. Perhaps even more important is that "...school officials are finding that extending the lines from the one connection [to the school] to various classrooms is prohibitively expensive and, in some cases, practically impossible" (West, March 2, 1994, p. 31). According to West:

> ...it seems clear that retrofitting schools to provide classroom-level access will require a huge public-works project easily comparable to the national effort to make aging schools safe from asbestos contamination (p. 32).

The Star Schools Program provides the opportunity to document the specific problems experienced by schools and districts interested in increasing educational opportunities through distance learning. Except for the statewide program, all participating districts have volunteered for the program. Consequently, they are strongly motivated to overcome obstacles created by their

facilities. Their ability to do so was enhanced by funding, for equipment and sometimes for classroom retrofitting, from the Star Schools Program. How more daunting the task for schools that do not receive special funds!

Although technical and facilities issues related to the use of distance-learning technologies are great, there are even greater issues regarding teacher training and integrating distance learning with other reform efforts. Discussion of including schools on the information superhighway should address facility, program, and teacher development issues in the context of how and why schools should use the system.

References

Anderson, R. E. (Ed.) (1993). *Computers in American schools 1992: An overview*. Minneapolis: IEA Computers in Education.

Education Acts, Amendments, 1991, § 20, III U.S.C. § 3412 (1991).

Kahlenberg, R. (1994, January 10). Give schools a ride on the information highway. *Los Angeles Times*, p. B7.

Marshall, C., & Rossman, G. (1989). *Designing qualitative research*. Newbury Park, CA: Sage.

Miles, M. B., & Huberman, A. M. (1984). *Qualitative data analysis: A sourcebook of new methods*. Newbury Park, CA: Sage.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook*. Thousand Oaks, CA: Sage.

Tushnet, N., Bodinger-deUriarte, C., Manuel, D., van Broekuizen, D., Millsap, M. A., & Chase, A. (1993). *Star Schools Evaluation report one*. Los Alamitos, CA: Southwest Regional Laboratory.

West, P. (1994, March 2). The last mile. *Education Week, 13*(23), 31-34.

Steinert-Threlkeld, T. (1994, January 16). Superhighway may miss schools. *San Francisco Chronicle*.

Yin, R. (1981). *Case study research: Design and methods*. Newbury Park, CA: Sage.